

## CLAIMS

1. A switching power source comprising:
  - a switching element being connected in series with a primary winding of a transformer connected to a DC power source;
  - a first rectifying/smoothing circuit configured to rectify and smooth AC power induced by a secondary winding of the transformer;
  - 10 a second rectifying/smoothing circuit configured to rectify and smooth AC power induced by an auxiliary winding of the transformer and to provide an internal power source;
  - 15 an output detection circuit configured to detect an output voltage that is provided from the first rectifying/smoothing circuit to a load; and
  - a control circuit configured to control the ON-period of a pulse signal supplied to the switching element according to a feedback voltage from the output detection circuit, the control circuit comprising:
    - 20 an overcurrent detection circuit configured to detect whether or not an overcurrent exceeding a predetermined reference value is passed through the switching element; and
    - 25 a constant-current drooping control circuit configured to select one of a first constant current and a second constant current smaller than the first constant current according to an overcurrent detection result from the overcurrent detection circuit and to superpose the selected current on the feedback voltage from the output
    - 30 detection circuit, wherein

the control circuit controls the ON-period of the pulse signal supplied to the switching element according to a resultant feedback voltage provided by the feedback voltage superpose circuit.

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2. A switching power source comprising:

a switching element being connected in series with a primary winding of a transformer connected to a DC power source;

10 a first rectifying/smoothing circuit configured to rectify and smooth AC power induced by a secondary winding of the transformer;

a second rectifying/smoothing circuit configured to rectify and smooth AC power induced by an auxiliary winding 15 of the transformer and to provide an internal power source;

a first output detection circuit configured to detect an output voltage that is provided from the first rectifying/smoothing circuit to a load;

20 a second output detection circuit configured to detect an output voltage provided from the second rectifying/smoothing circuit; and

a control circuit configured to control the ON-period of a pulse signal supplied to the switching element according to a feedback voltage from the first and second 25 output detection circuits, the control circuit comprising:

an overcurrent detection circuit configured to detect whether or not an overcurrent exceeding a predetermined reference value is passed through the switching element;

30 a constant-current drooping control circuit

configured to select one of a first constant current and a second constant current smaller than the first constant current according to an overcurrent detection result from the overcurrent detection circuit, output the selected 5 current, and carry out constant-current drooping control; and

a feedback voltage superpose circuit configured to superpose the first constant current provided by the constant-current drooping control circuit on the feedback 10 voltage provided by the first and second output detection circuits and to superpose the second constant current on an output of an impedance converter of the feedback voltage, wherein

the control circuit controls the ON-period of the 15 pulse signal supplied to the switching element according to a resultant feedback voltage provided by the feedback voltage superpose circuit.

3. A switching power source comprising:

20 a switching element being connected in series with a primary winding of a transformer connected to a DC power source;

a first rectifying/smoothing circuit configured to rectify and smooth AC power induced by a secondary winding 25 of the transformer;

a second rectifying/smoothing circuit configured to rectify and smooth AC power induced by an auxiliary winding of the transformer and to provide an internal power source;

a first output detection circuit configured to detect 30 an output voltage that is provided from the first

rectifying/smoothing circuit to a load;

a second output detection circuit configured to detect an output voltage provided from the second rectifying/smoothing circuit; and

5 a control circuit configured to control the ON-period of a pulse signal supplied to the switching element according to a feedback voltage from the first and second output detection circuits, the control circuit comprising:

10 a feedback voltage detection circuit configured to detect whether or not an overload state is present according to the feedback voltage from the output detection circuits;

15 a constant-current drooping control circuit configured to switch a first constant current and a second constant current smaller than the first constant current from one to another according to an overload detection result from the feedback voltage detection circuit and to carry out constant-current drooping control; and

20 a feedback voltage superpose circuit configured to superpose the first constant current provided by the constant-current drooping control circuit on the feedback voltage provided by the first and second output detection circuits and to superpose the second constant current on an output of an impedance converter of the feedback voltage,

25 wherein

the control circuit controls the ON-period of the pulse signal supplied to the switching element according to a resultant feedback voltage provided by the feedback voltage superpose circuit.

4. A switching power source comprising:
  - a switching element being connected in series with a primary winding of a transformer connected to a DC power source;
  - 5 a first rectifying/smoothing circuit configured to rectify and smooth AC power induced by a secondary winding of the transformer;
  - 10 a second rectifying/smoothing circuit configured to rectify and smooth AC power induced by an auxiliary winding of the transformer and to provide an internal power source;
  - 15 a first output detection circuit configured to detect an output voltage that is provided from the first rectifying/smoothing circuit to a load;
  - 20 a second output detection circuit configured to detect an output voltage provided from the second rectifying/smoothing circuit; and
  - 25 a control circuit configured to control the ON-period of a pulse signal supplied to the switching element according to a feedback voltage from the first and second output detection circuits, the control circuit comprising:
    - an overcurrent detection circuit configured to detect whether or not an overcurrent exceeding a predetermined reference value is passed through the switching element;
    - 25 a constant-current drooping control circuit configured to switch a first constant current to second and third constant currents that are each smaller than the first constant current, or in the other way according to an overcurrent detection result from the overcurrent detection circuit and to carry out constant-current drooping control;

and

a constant-current superpose circuit configured to superpose the first and second constant currents provided by the constant-current drooping control circuit on the 5 feedback voltage provided by the first and second output detection circuits and to superpose the third constant current on an output of an impedance element being connected in series between feedback voltage superpose circuits, wherein

10 the control circuit controls the ON-period of the pulse signal supplied to the switching element according to a resultant feedback voltage provided by the feedback voltage superpose circuits.

15 5. The switching power source according to claim 1, wherein

the overcurrent detection circuit employs each of the feedback voltage provided by the feedback voltage superpose circuit and a second reference voltage as the predetermined 20 reference value.

6. The switching power source according to claim 1 or 2, wherein

the constant-current drooping control circuit changes 25 the second constant current to the first constant current in a case where a voltage divided value of the power source voltage obtained by rectifying and smoothing the AC voltage induced by the auxiliary winding of the transformer exceeds the feedback voltage provided by the first and second 30 output detection circuits.

7. The switching power source according to claim 3,  
wherein

the constant-current drooping control circuit changes  
5 the second and third constant currents to the first  
constant current in a case where a voltage divided value of  
the power source voltage obtained by rectifying and  
smoothing the AC voltage induced by the auxiliary winding  
of the transformer exceeds the feedback voltage provided by  
10 the output detection circuits.